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the variables 22. The *representative* generating function in this case (as in all others which have been hitherto treated, with the sole exception of the seventhic) has a *finite* numerator.

The total number of groundforms for the orders 0, 2, 4, 6 respectively (counting, as one ought to do, the absolute constant as one of them) is 1, 3, 6, 27, which becomes a regular series on increasing 6, which corresponds to a square index 4, in the proportion of 2:3. In like manner, for the orders 1, 3, 5, 7, 9, the series is 2, 5, 24, 125, 416, which, on increasing the last term corresponding to the square index 9 in the ratio 2:3, forms an almost regular progression 2, 5, 24, 125, 624, highly suggestive of the geometrical series 1, 5, 25, 125, 625. It seems then to be a not altogether improbable conjecture, that the number of groundforms for 10, which I hope very soon to get completely worked out, will be in the neighbourhood of a ratio of equality to 243,* and for 11, which there is not much prospect of calculating for some time to come, a number not very far out from a ratio of equality to 3125. In the next, or next but one, number of the *Journal* I hope to set out a synoptical table of the groundforms for all orders up to 10 inclusive, with their reduced and representative generating functions, as also for combinations of the orders: 2, 3; 2, 4; 3, 3; 3, 4; 4, 4; all the materials for which, with the exception of what pertains to the covariants *proper* of the tenthic, are already in existence.

***Extract of a Letter from Sig. A. de Gasparis
to Mr. Sylvester.***

... J'ai trouvé certaines séries dans lesquelles les éléments tels que le rayon vecteur, les anomalies excentriques et vraies, etc., sont exprimés en fonction de l'anomalie moyenne *donnée en parties du rayon* sans sinus ou cosinus. Comme essai, je vous comunique les suivantes dans lesquelles e = excentricité, v et M anomalie vraie et moyenne. En outre a = demigrand axe, i , ϕ inclinaison et noend, π perihelie, $\psi = \pi - \phi$. J'ai trouvé

$$v = \sqrt{\frac{1+e}{1-e}} \left\{ \frac{M}{1-e} - \frac{M^3}{6} \frac{2e}{(1-e)^4} + \frac{M^5}{120} \frac{2e + 2ae^2}{(1-e)^7} - \frac{M^7}{5040} \frac{18e + 22e^2 - 900e^3}{(1-e)^{10}} + \dots \right\};$$

et posant

$$H = (1-e) \sin \psi + \frac{M}{1} \sqrt{\frac{1+e}{1-e}} \cos \psi - \frac{M^2}{2} \frac{\sin \phi}{(1-e)^2} - \frac{M^3}{6} \sqrt{\frac{1+e}{1-e}} \frac{\cos \phi}{(1-e)^3}$$

* The number of groundforms for the Octavic (I quote from memory) is 70, not more inferior to 81 than might have been anticipated, when the composite form of the number 8 is taken into account. It seems likely that for 10, 243 is at all events a superior limit.

$$\begin{aligned}
& + \frac{M^4}{24} (1 + 3e) \frac{\sin \phi}{(1-e)^5} + \frac{M^5}{120} \sqrt{\frac{1+e}{1-e}} (1 + 9e) \frac{\cos \phi}{(1-e)^6} - \dots, \\
K = & (1-e) \cos \psi - \frac{M}{1} \sqrt{\frac{1+e}{1-e}} \sin \psi - \frac{M^2}{2} \frac{\cos \phi}{(1-e)^2} + \frac{M^3}{6} \sqrt{\frac{1+e}{1-e}} \frac{\sin \phi}{(1-e)^3} \\
& + \frac{M^4}{24} (1 + 3e) \frac{\cos \phi}{(1-e)^5} - \frac{M^5}{120} \sqrt{\frac{1+e}{1-e}} (1 + 9e) \frac{\sin \phi}{(1-e)^6} - \dots,
\end{aligned}$$

l'on a pour la valeur des coordonnées héliocentriques z , x et y

$$\frac{z}{a} = \sin i . H; \quad \frac{x}{a} = \cos \phi . K - \sin \phi \cos i . H; \quad \frac{y}{a} = \sin \phi . K + \cos \phi \cos i . H.$$

L'on peut aussi développer, comme j'ai fait jusqu' aux cubes de M , la valeur inverse du cube de la distance mutuelle des deux masses, telle que se présente dans la théorie des perturbations. Dans ce cas figurent les deux variables M_1 et M_2 . Par la relation linéaire qui existe entre le temps et l'anomalie moyenne il peut être utile de considérer ces développements dans le calcul des perturbations.

J'ai publié aussi dans les actes des académies des Lincei et de Naples, le coefficient du terme qui multiplie la 4^{ème} puissance du temps dans la série qui donne la correction de la coordonnée x *elliptique* pour avoir la valeur de la x troublée dans le temps T après le temps t pour lequel on connaît les x , y , z et leurs dérivées x' , y' , z' , étant m_1 la masse troublée, et m_2 la masse troublante. Ce coefficient, sauf un facteur connu de l'ordre m_2 , est

$$\begin{aligned}
& + \frac{x_1}{r_1^3 \rho_{12}^3} - \frac{x_2}{r_2^3 \rho_{12}^3} - \frac{(m_1 + m_2)(x_2 - x_1)}{\rho_{12}^6} + \frac{(1 + m_2)x_2}{r_2^6} + \frac{m_1 x_1}{r_1^3 r_2^3} - \frac{6(x'_2 - x'_1)\rho'_{12}}{\rho_{12}^4} \\
& + \frac{15(x_2 - x_1)\rho'^2_{12}}{\rho_{12}^5} + \frac{6x'_2 r'_2}{r_2^4} - \frac{3(x_2 - x_1)^2}{\rho_{12}^5} \left\{ \frac{x_1}{r_1^3} - \frac{x_2}{r_2^3} - \frac{(m_1 + m_2)(x_2 - x_1)}{\rho_{12}^3} \right\} \\
& - \frac{3(x_2 - x_1)(y_2 - y_1)}{\rho_{12}^5} \left\{ \frac{y_1}{r_1^3} - \frac{y_2}{r_2^3} - \frac{(m_1 + m_2)(y_2 - y_1)}{\rho_{12}^3} \right\} \\
& - \frac{3(x_2 - x_1)(z_2 - z_1)}{\rho_{12}^5} \left\{ \frac{z_1}{r_1^3} - \frac{z_2}{r_2^3} - \frac{(m_1 + m_2)(z_2 - z_1)}{\rho_{12}^3} \right\} \\
& - \frac{3x_2^2}{r_2^5} \left\{ \frac{m_1(x_2 - x_1)}{\rho_{12}^3} + \frac{(1 + m_2)x_2}{r_2^3} + \frac{m_1 x_1}{r_1^3} \right\} - \frac{3x_2 y_2}{r_2^5} \left\{ \frac{m_1(y_2 - y_1)}{\rho_{12}^3} + \frac{(1 + m_2)y_2}{r_2^3} + \frac{m_1 y_1}{r_1^3} \right\} \\
& - \frac{3x_2 z_2}{r_2^5} \left\{ \frac{m_1(z_2 - z_1)}{\rho_{12}^3} + \frac{(1 + m_2)z_2}{r_2^3} + \frac{m_1 z_1}{r_1^3} \right\} - \frac{3(x_2 - x_1)}{\rho_{12}^5} \left\{ (x'_2 - x'_1)^2 + (y'_2 - y'_1)^2 + (z'_2 - z'_1)^2 \right\} \\
& + \frac{m_1(x_2 - x_1)}{r_2^3 \rho_{12}^3} - \frac{12x_2 r'^2_2}{r_2^5} + \frac{3x_2}{r_2^5} (x'^2_2 + y'^2_2 + z'^2_2 - r'^2_2).
\end{aligned}$$